U.S. Environmental Protection Agency
Response to World Trade Center Disaster

March 2004

Indoor Air Residential Assistance Program Overview

- Assistance to impacted NYC residents concerned about the environmental and health implications of dust/debris from the WTC collapse and fires on indoor environments
- February 2002 - Senate hearings
- February 2002 - EPA establishes WTC Indoor Air Task Force Working Group to design program
- April 2002 - EPA assumes lead for indoor program
- May 2002 – Indoor Air Residential Assistance Program Announced

WTC Indoor Air Task Force Working Group

- This task force included representatives from:
  - U.S. Environmental Protection Agency
  - Federal Emergency Management Agency
  - U.S. Occupational Safety and Health Administration
  - Agency for Toxic Substances and Disease Registry
  - NYS Department of Environmental Conservation
  - NYS Department of Health
  - NYC Department of Environmental Protection
  - NYC Department of Health and Mental Hygiene
  - NYC Mayor's Office of Environmental Coordination
  - NYC Office of Emergency Management
  - NYC Department of Citywide Administrative Services

Funding

- FEMA Program
  - IAGs to EPA total approximately $15 million
  - Funding to NYC approximately $30 million

- Five significant efforts in parallel
  1) Cleaning building exteriors
  2) Selecting COPCs and Setting Health-Based Benchmarks
  3) Confirmation Cleaning Study
  4) Background Study
  5) WTC Indoor Clean-up Program

WTC Indoor Environment Assessment: Selecting COPCs and Setting Health Based Benchmarks

- Prepared by the COPC Committee (USEPA, NYCDOHMH, ATSDR, NYSDOH and OSHA) of the WTC Indoor Air Task Force Working Group
- Semi-quantitative screening of available WTC sampling data and historical information on building collapses/fires to identify COPC likely associated with the WTC disaster and establish health-based benchmarks
- COPC: Dioxin, PAH's, Lead, Asbestos, Fibrous glass and Crystalline Silica
- Peer-reviewed through the facilitation of an EPA contractor, Toxicology Excellence for Risk Assessment, and modified based on peer review comments

Peer Reviewers

- Dr. Jerrold Abraham, SUNY Upstate Medical University
- Dr. John Christopher, California EPA
- Dr. Annette Giuseppi-Elie, Dupont Engineering
- Dr. Lynn Goldman, The Johns Hopkins University School of Public Health
- Dr. Hugh Granger, HP Environmental
- Dr. Dennis Paustenbach, Exponent Bertram Price – Price Associates
- Dr. Charles Salocks, California EPA
- Dr. Susan Youngren, Bergeson & Campbell
- Mr. John Kominsky, Environmental Quality Management

Development of COPC Health-based Benchmarks

- Benchmarks developed for indoor air and settled dust
- Hierarchy for benchmark development:
  - Relevant and appropriate regulations (lead)
  - Health-based using USEPA risk assessment methods (asbestos, dioxin, PAHs)
  - Adaptation/modification of occupational standards (fibrous glass, crystalline silica)

Development of COPC Health-based Benchmarks

- Regulations are default, e.g. HUD Lead
- Health-based approach
  - IRIS verified toxicity criteria
    - Account for sensitive sub-populations
    - New cancer guidelines
  - 10^{-04} x 30 yr or HQ=1 (or background)
- Modification of occupational standard

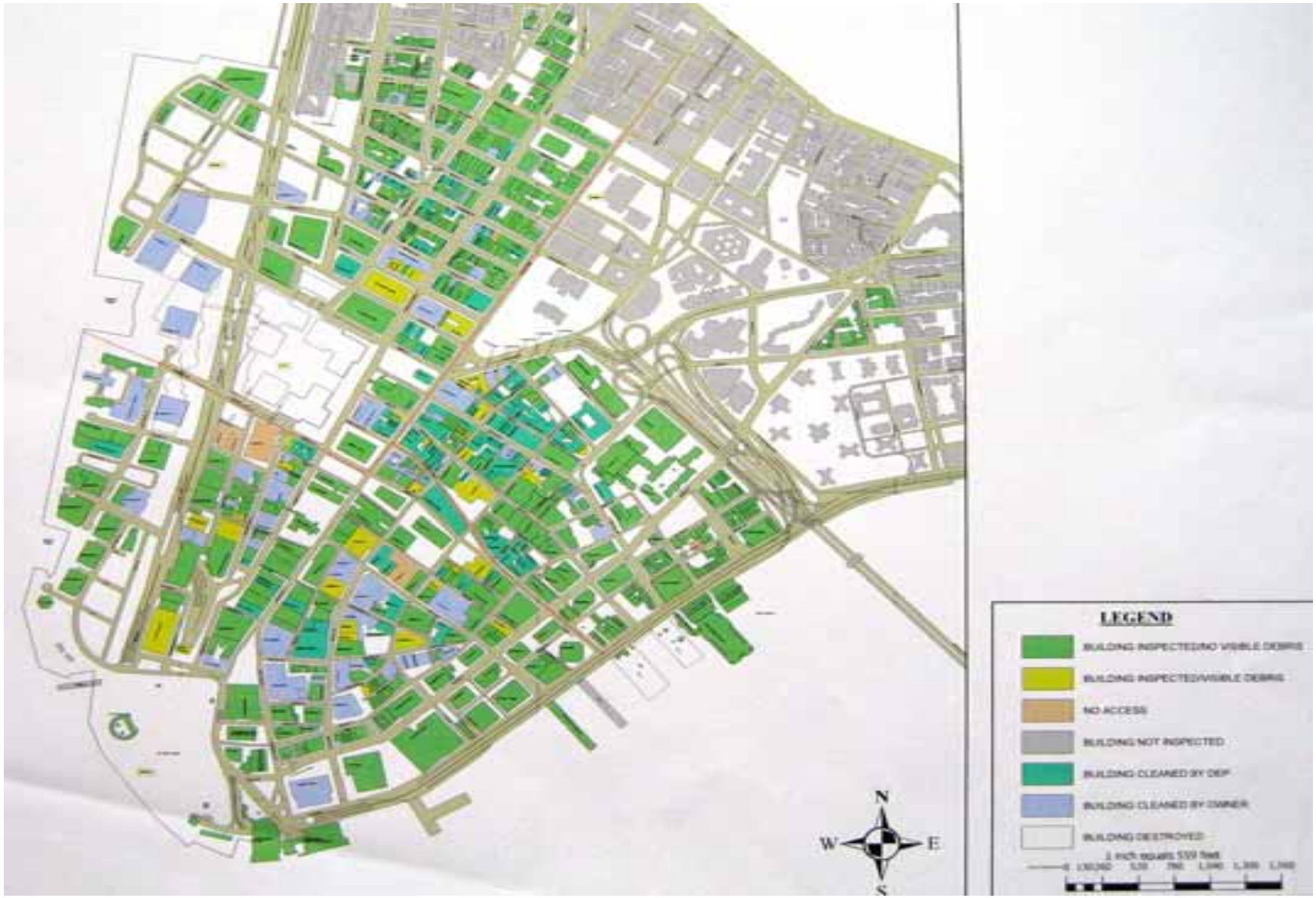
Health Based Benchmarks Established in COPC Report

Analyte	Air	Settled Dust
Asbestos (HB)	0.0009 s/cc	n/a
Lead (HB/Reg.)	0.7 ug/m^3	25 ug/ft^2
MMVF (Occup.)	0.01 s/cc	n/a
Dioxin (HB)	0.001 ng/m^3	2 ng/m^2
PAH (HB)	0.2 ug/m^3	150 ug/m^2
Silica (Occup.)	5 ug/m^3	n/a

Cleaning Building Exteriors

- NYC led this effort; EPA provided inspection/evaluation and oversight support
- Began in June 2002 and completed in April 2003
- Objective to prevent continuing exposures and recontamination of interior spaces from exterior sources
- 1074 buildings were evaluated
- 750 were cleared without cleaning
- 323 were cleaned
- 1 NYC in the process of coming to agreement with owner to clean

Building Exterior Survey



Confirmation Cleaning Study

- Designed to confirm that cleaning methods recommended to the public were effective
- Five-story building, overlooking WTC site with windows destroyed during collapse
- Unoccupied commercial (5) and residential (13)
- Eleven cleaning methods evaluated
  - Combinations of retail and commercial vacuums w/ or w/o HEPA-filters, air filtration devices, wet wiping, and water extraction
  - HVAC standard cleaning methods also evaluated

Sample Collection and Analysis

- Samples collected before cleaning
  - Wipe and microvacuum
- Samples collected after cleaning
  - Wipe, microvacuum, and air
  - Hard and porous surfaces from horizontal and vertical surfaces
- Analyzed for asbestos, lead, MMVF, dioxin, PAHs, crystalline silica (alpha-quartz, cristobalite, tridymite), gypsum, calcite, and total dust

Confirmation Cleaning Study

Category	Air	Microvac	Wipe	Grand Total
Asbestos	278	175	213	666
Calcite	109		185	294
Dioxin	6		193	199
Dust		5		5
Gypsum	109		185	294
Lead	146	175	212	533
MMVF	210		201	411
PAH	4		193	197
Silica	109		185	294
Total Dust			179	179
VOCs	5			5
Grand Total	976	355	1746	3077

Confirmation Cleaning Study Results Summary

- Demonstrated that vacuuming and wet wiping significantly reduced levels of WTC-related contamination with each cleaning event and were successful in reducing concentrations to levels below health-based benchmarks.
- Multiple cleaning events may be necessary to reach health-based benchmarks
- Identified asbestos in air sampling as measure of cleanliness

Background Study

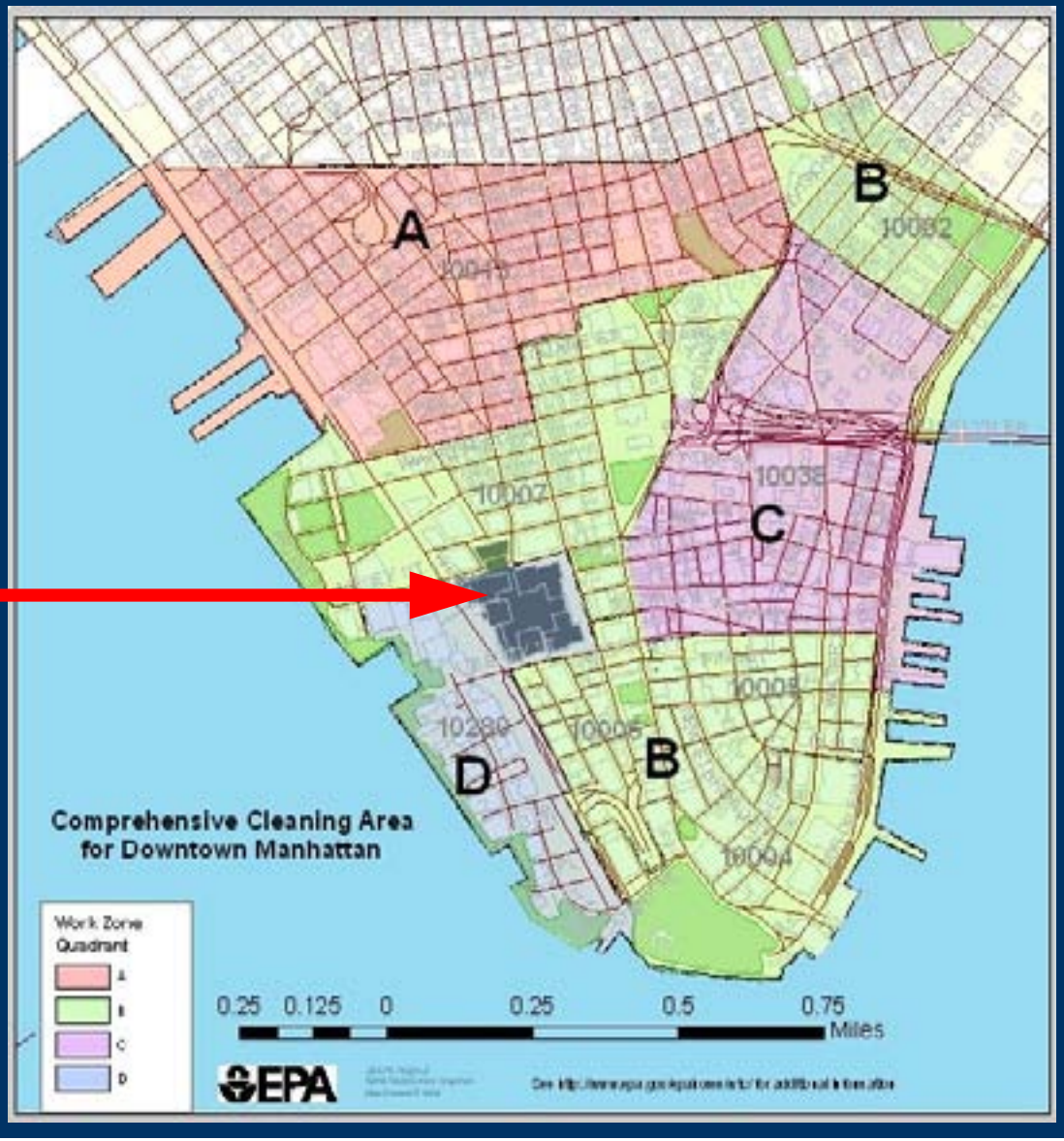
- Designed by WTC Indoor Air Task Force Working Group to provide estimates of baseline levels or background concentrations of COPC
- Sampling carried out by EPA north of 78th street in Manhattan
- Area projected by ORD modeling to be minimally impacted
- Results indicate that measured values were consistent with available literature

Background Study

- Fourteen buildings, north of 78th Street
  - 5-8 miles north of WTC site
  - Three spaces in each building – two residential and one common space
- Collection of settled dust (from hard and porous surfaces) and airborne dust
- Background concentration estimate derived for each analyte, space, and matrix sampled

WTC Indoor Clean-up Program

World Trade Center site



WTC Indoor Clean-up Program Sampling Methods

- Three pre-cleaning and three post-cleaning (if apartment was cleaned) wipe samples per analyte.
- Metal and mercury wipe samples were collected with procedures specified in HUD Appendix 13.1.
- Dioxin wipe samples were collected with procedures specified in ASTMD 6661-01
- Three to five asbestos in air samples collected in each apartment with procedures specified in NIOSH 7400 with minimum sample volume of 3600 liters and analyzed by both PCM and TEM

WTC Indoor Clean-up Program

- Cleaning and Testing of residential buildings upon request with asbestos air sampling and limited wipe sampling for dioxin and metals
- Residential – Asbestos, approx. 1% exceeded .0009 f/cc
  - Cleaned/Tested - 3,403 units, 35 exceeded, 133 not determined
  - Tested - 763 units, 9 exceeded, 33 not determined
- Whole Buildings
  - Common areas in 144 buildings cleaned and tested
  - HVAC systems evaluated 116 – 33 impacted
  - HVAC systems cleaned/partially cleaned – 28

WTC Indoor Clean-up Program

Cleaning Exterior

Cleaning

Air Sampling

HVAC Evaluation

Cleaning

Wipe Sampling

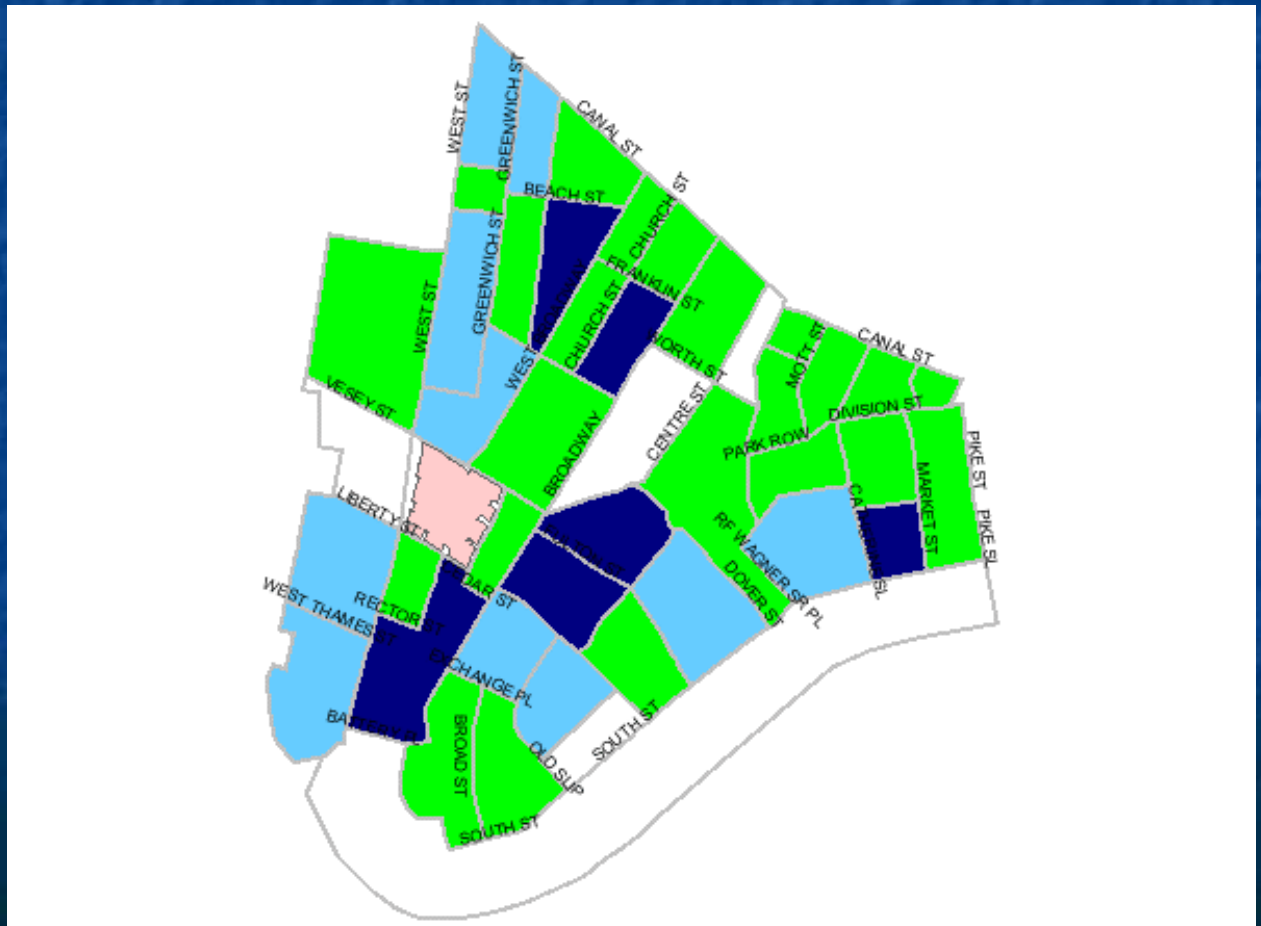
Asbestos Sampling Results

	number	% Samples
Total Samples	**29687**	
Field Samples	27890	
Asbestos Detected	589	2.11
Asbestos Exceedences	123	0.44
Filter Overloads	438	1.57
Maximum Concentration (f/cc)	0.0204	

Cleanup Result Summary Map

Green, light blue, or dark blue areas are areas where samples have been taken with each color denoting the percent of samples in that area that exceeded EPA's clearance criteria .

- Green - no samples taken exceeded EPA's criteria.
- Light Blue - up to 1% of the samples taken exceeded EPA's criteria.
- Dark Blue - more than 1% but less than 10% of the samples taken have exceeded EPA's criteria.



Wipe Sampling

- Sampled for 23 metals and Dioxin
- Metals other than COPC were analyzed as they were part of standard EPA metals analysis
- 156 Buildings
- 222 Apartments pre- and post-cleaning
- 41 Apartments pre-cleaning only
- ~ 1520 Samples
- Exceedances for Antimony, Dioxin, Lead and Mercury when compared to COPC benchmarks

Wipe Sampling Exceedances

Analyte	Pre Cleaning and Test Only Exceedances			Post Cleaning Exceedances		
	Bldgs	Apts	Samples	Bldgs	Apts	Samples
Antimony	2	2	2			
Dioxin	3	3	6	2	2	2
Lead	72	81	115	16	16	21
Mercury	5	5	5	1	1	1

Current Activities

- Closeout FEMA-funded activities
- Final report of WTC Indoor Clean-up Program